



**Question 1 (Periodicity)**

Determine if the following signals are periodic or not. If periodic, find the fundamental period. Fill your answers in the table and justify your answers.

	$x[n]$	Not-Periodic	Periodic	Fundamental Period
(a)	$x[n] = \cos\left(\frac{n}{4}\right) \cos\left(\frac{\pi n}{4}\right)$			
(b)	$x[n] = \exp\left[j\frac{3}{5}\pi n + 2\right]$			
(c)	$x[n] = \cos(\pi n^2/6)$			

**Question 2 (Signal Transformation)**

For the discrete-time signal

$$x[n] = -2\delta[n + 2] + \delta[n + 1] + 3\delta[n] - \delta[n - 2] + 4\delta[n - 3]$$

Sketch the following discrete-time signals:

- $x[n]$
- $y[n] = x[-n]$
- $z[n] = x[2 - n]$
- $w[n] = x[2n + 1]$

Sketch the Even and Odd parts of  $x[n]$ .

**Question 3 (System Properties)**

For the following system, determine if it is memoryless, time-invariant, linear, causal and stable.

Is the system invertible? If it is, construct the inverse system. If it is not, find two input signals to the system that have the same output.

**Justify your answer**

$$S_1 : \quad y[n] = nx[n]$$

**Question 4 (System Properties)**

Determine if each of the following systems is invertible. If it is, construct the inverse system. If it is not, find two input signals to the system that have the same output.

$$y[n] = nx[n]$$

$$y[n] = x[1 - n]$$